Cerulean Warbler breeding ground dispersal and population structure

Different metrics tell different stories.

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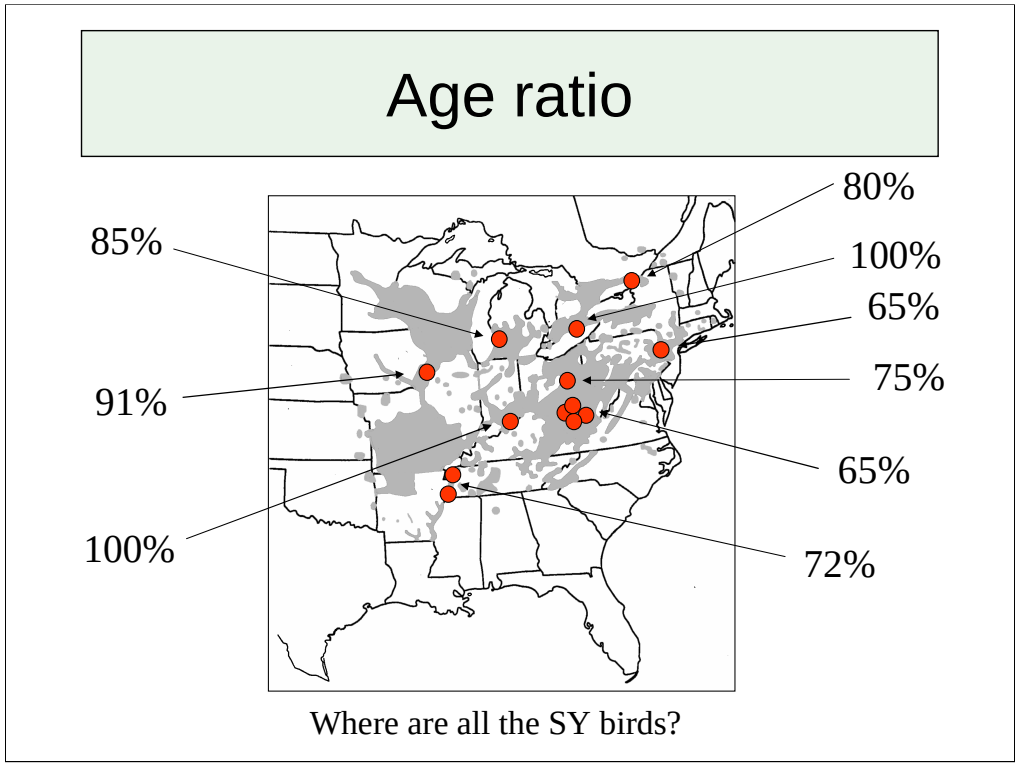
CR - It looks like the data support a moderate degree of differentiation of CERW populations, with support also for a significant amount of between-year dispersal of ASY males. Dispersal does not appear great enough to eliminate local adaptations, which are maintained by a significant amount of connectivity between wintering and breeding sites (populations). Fragmentation may either increase or decrease local adaptation.

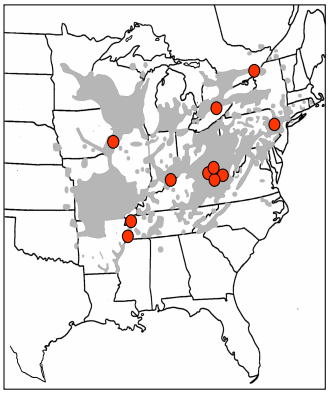


ASY males replacing ASY males (local or long-distance recruits)

Internal parasites

One-third of adult males infected with *Haemoproteus paruli.*

	Parasitemia (#/2000 RBC)	Prevalence (n)
ON	0.77	0.16 (37)
IL	0.64	0.14 (14)
PA	0.18	0.12 (17)
IN	4.35	0.21 (19)
WV	7.71	0.82 (22)
TN	12.20	0.50 (10)



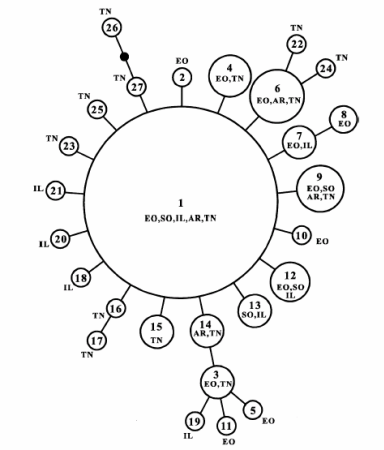
Gibb et al. 2005. Can. J. Zool. 86:626-629.

- 1/3 may be the average but high variability
- south hit harder than north

- vector differences? sources of parasites?
- possibly each site has its own load which arrivals soon acquire or the arrive with them from the wintering grounds
- no age-related difference
- migration-induced susceptibility

Genetic variability - or not

- one haplotype in 63% of 152 individuals
- 45% of 78 alleles shared by all populations



Veit et al. 2005 Cons. Gen. 6:159-174

5 microsatellite loci and a 366 base-pair fragment of the mitochondrial control region

Adult/natal dispersal

	Assignment (year *t*-1)			
Capture region (year *t*)	ON	IL	TN	PA/WV
ON	14/8	0/0	1/0	0/0
IL	5/0	7/0	0/0	6/1
TN	0/0	1/1	12/7	0/0
PA	2/0	7/2	0/0	3/5
WV	0/0	11/5	2/1	0/2
Totals	21/8	26/8	15/8	9/8

Girvan. 2003. M.Sc. Queen's University

deuterium only for this chart

1. dispersal from close in north (Ontario) and south (Tennessee), mixed in the middle

2. dispersal of adults more common then that of young birds

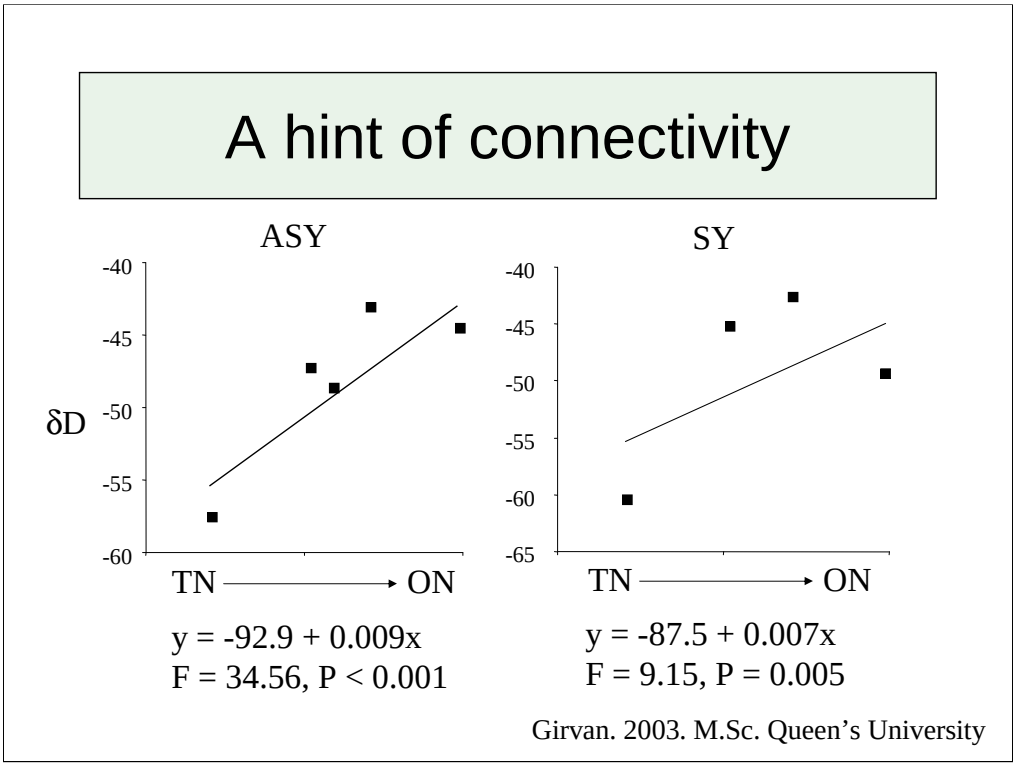
natal and breeding dispersal from her unpublished data using a likelihood assignment test

For three primary reasons, these results should only be considered a starting point for future analyses.

1. recent evidence suggests that not all migratory songbird feathers are molted on the breeding grounds the previous year (Norris et al. 2004b). We propose the test this assumption in Ceruleans by capturing individuals the one season (year *t*-1) and sampling them at the same site the following season (year *t*); this will give us isotopic values for birds of known breeding location.

2. Girvan (2003) analyzed a single isotope (δD) which provides only weak spatial resolution to distinguish between breeding regions. We will use multiple isotopes to increase the accuracy of assignments.

3. Girvan only collected individuals from four BCR regions making it difficult to examine the effects of age, population status and range dynamics. We propose to sample populations in ten BCR regions that cover the entire range of Cerulean Warblers.



deltaD of crown feathers indicative of winter signature

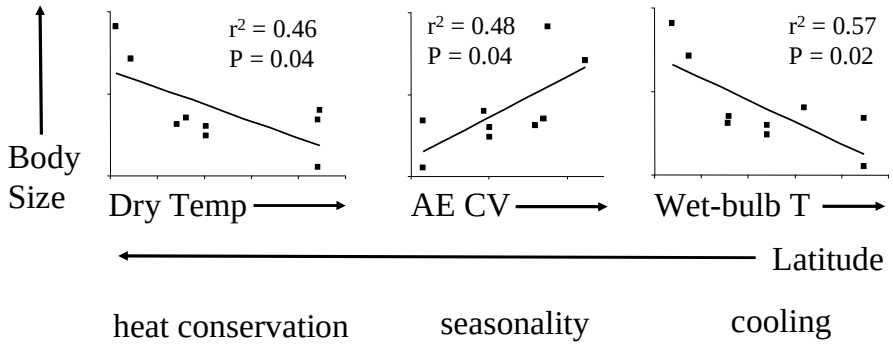
high negative values indicate south winter range, low negative values indicate north winter range

No sampling location exhibited significant differences between ASY and SY signature, implying no age-based segregation of males.

Sample size limitations with SY analysis, despite high F and low P

Significant morphological variability

Adherence to Bergmann's Rule despite gene flow/dispersal



Jones et al. 2005 J. Biogeog. 32:1827-1833.

1. Phenotypic versus genotypic plasticity

Three univariate measures (tarsus, mass, wing) – 2 (tarsus and mass) were positively related to latitude as was PC1

PC1 – 70% of variance – positively weighted on tarsus and mass

Dry T – negative correlation with latitude

Wet T – negative correlation with latitude

AE CV – positive correlation

1. Multiple perturbations structuring a "single" trait
2. Thermodynamics can affect summer residents too.

What does it all mean?

- role for migratory connectivity
  - prevents dilution of selection pressures
  - allows for expression of non-breeding season pressures on the breeding grounds
- volatile dynamics and increasing population fragmentation may hasten differentiation
  - countered by dispersal but for how long

CR - seems at least theoretically possible that fragmentation could dilute differentiation if it fosters long-distance dispersal by ASY

Acknowledgments

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